

Five Species of Phytoseiid Mites from Japan with Descriptions of Two New Species (Acarina, Phytoseiidae)

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ABSTRACT — Two new species of phytoseiid mites were described from Japan: *Typhlodromus (Anthoseius) higoensis* n. sp. from bamboo in Kumamoto Prefecture, Kyushu, and *Amblyseius (Amblyseius) hirotae* n. sp. from *Ischaemum anthephoroides* (Steud.) Miq. and others in Tottori Prefecture, Honshu. *Typhlodromus (Paraseiulus) soleiger* (Ribaga), new to Japan, was redescribed on the basis of specimens from Hokkaido. Further, the males of *Amblyseius (Amblyseius) koyamanus* Ehara et Yokogawa and *Amblyseius (Indoseiulus) liturivorus* Ehara were described and figured for the first time.

INTRODUCTION

A total of sixty-three species of the mite family Phytoseiidae were previously known to occur in Japan [1-5]. In this paper descriptions and records are given of five Japanese species of the family, including two new species and one species new to this country. The materials on which the study is based were taken from plants in Hokkaido, Honshu and Kyushu. The type-series of the new species are deposited in the collection of the Biological Institute, Faculty of Education, Tottori University.

***Typhlodromus (Anthoseius) higoensis* n. sp.**
(Japanese name: Higo-kaburidani)
(Figs. 1-6)

Female Dorsal shield reticulate, with five pairs of solenostomes. Setae on dorsal shield: L_{10} stout, capitate, with minute barbs; remaining setae smooth; M_2 shorter than L_8 , and shorter than distance between bases of M_2 and L_8 ; L_9 slightly shorter than, or as long as L_8 . Setae S_1 and S_2 on interscutal membrane. Peritreme extending between setae D_1 ; posterior extension of

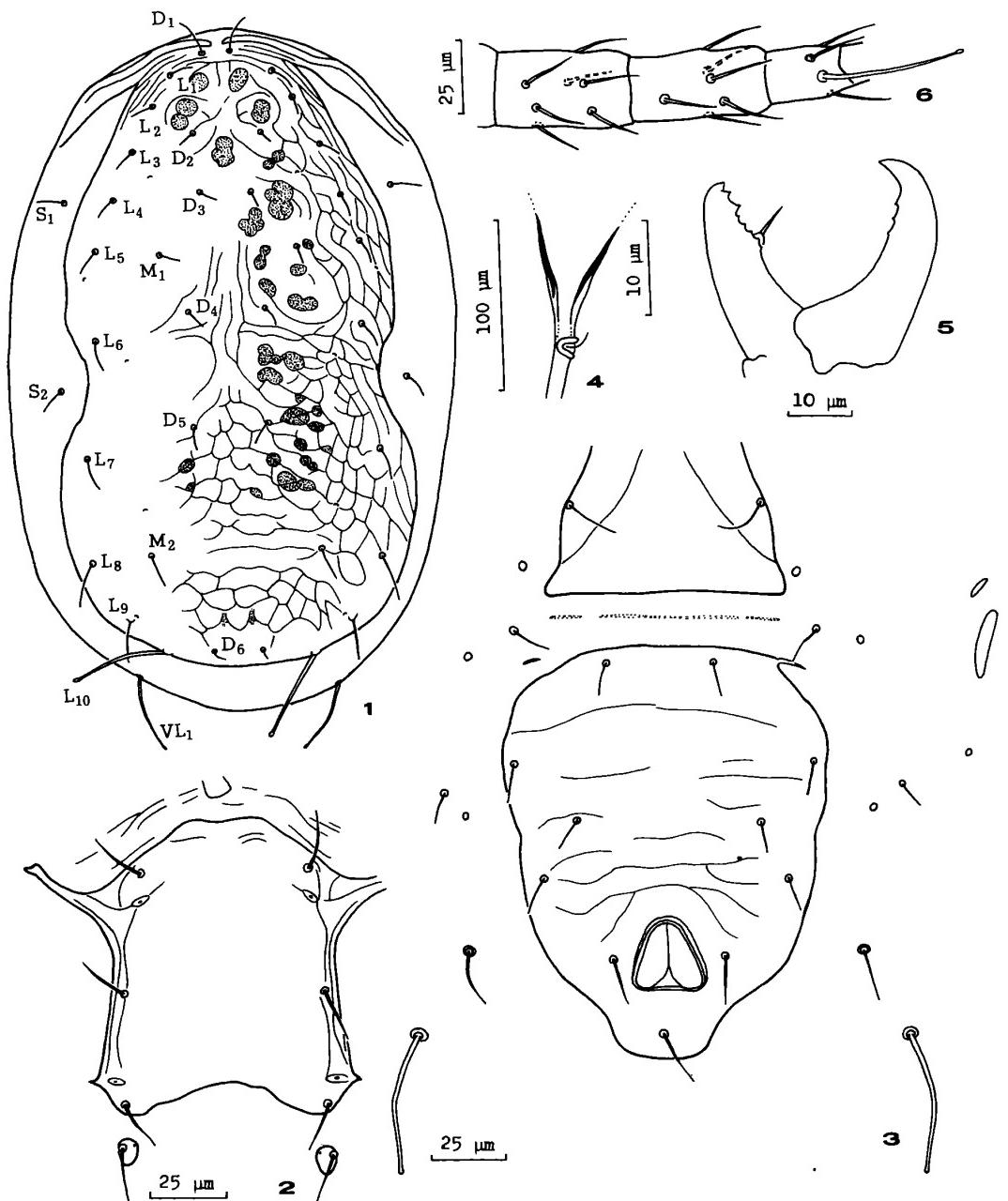
peritrematal shield with a transverse suture, ending in a truncate tip. Sternal shield with posterior margin concave, with three pairs of setae; metasternal platelets longer than wide. Ventrianal shield longer than wide, wider than genital shield, with lateral margins nearly straight; four pairs of preanal setae; a pair of very small solenostomes slightly intero-posteriad from posteromedian pair of preanals, but one of the solenostomes being often absent as in Figure 3. Seta VL_1 capitate. Two pairs of slender metapodal platelets. Spermatheca as figured. Chelicera with seven teeth on fixed digit, three on movable digit. Chaetotaxic formula: genu II, 2-2/0, 2/0-1; genu III, 1-2/1, 2/0-1. Basitarsus IV with a capitate macroseta. Measurements in μm : length of idiosoma 360, width of idiosoma 240; length of setae¹ ($n=10$): L_1 14.1 ± 0.2 , L_2 12.4 ± 0.2 , L_3 13.4 ± 0.1 , L_4 13.6 ± 0.2 , L_5 15.8 ± 0.2 , L_6 18.1 ± 0.3 , L_7 19.9 ± 0.3 , L_8 27.1 ± 0.3 , L_9 24.4 ± 0.3 , L_{10} 55.2 ± 1.0 , M_1 11.6 ± 0.2 , M_2 19.0 ± 0.3 , D_1 19.1 ± 0.2 , D_2 10.1 ± 0.1 , D_3 11.1 ± 0.1 , D_4 13.2 ± 0.2 , D_5 14.4 ± 0.2 , D_6 9.9 ± 0.2 , S_1 16.6 ± 0.2 , S_2 15.7 ± 0.1 , VL_1 42.3 ± 1.0 , macroseta on basitarsus IV 41.7 ± 0.6 .

Male Not known.

Type-series Holotype: ♀, Kumamoto University campus, Kurokami-chō, Kumamoto City,

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¹ Mean \pm S.E.



Figs. 1-6. *Typhlodromus (Anthoseius) higoensis* n. sp. (♀). 1: Dorsum of idiosoma. 2: Sternal shield. 3: Posterior ventral surface. 4: Spermatheca. 5: Chelicera. 6: Genu, tibia and basitarsus of leg IV.

Kyushu, 13-V-1983 (S. Ehara), on bamboo.
Paratypes: 6♀, 23-VIII-1983, other data the same as for holotype.

Remarks *Typhlodromus higoensis* n. sp. is not closely related to any described species belonging to the subgenus *Anthoseius* with three pairs of setae on the sternal shield. This species is distinctive in the combination of the following characters: Seta L_{10} capitate, much longer than the other dorsal setae; M_2 shorter than L_8 ;

ventrianal solenostomes very small, widely separated; spermathecal cervix nearly V-shaped; and leg IV with only one macroseta.

***Typhlodromus (Paraseiulus) soleiger* (Ribaga)**
(Japanese name: Shirakaba-kaburidani)
(Figs. 7-12)

Seiulus soleiger Ribaga, 1902 [6], p. 176.
Typhlodromus soleiger: Nesbitt, 1951 [7], p. 39, pl.

XII, figs. 30, 32; Chant *et al.*, 1974 [8], p. 1283, figs. 62–65; Chant and Yoshida Shaul, 1982 [9], p. 3027, figs. 13–16.

Typhlodromus (Typhlodromus) soleiger: Chant, 1959 [10], p. 59, figs. 66–67.

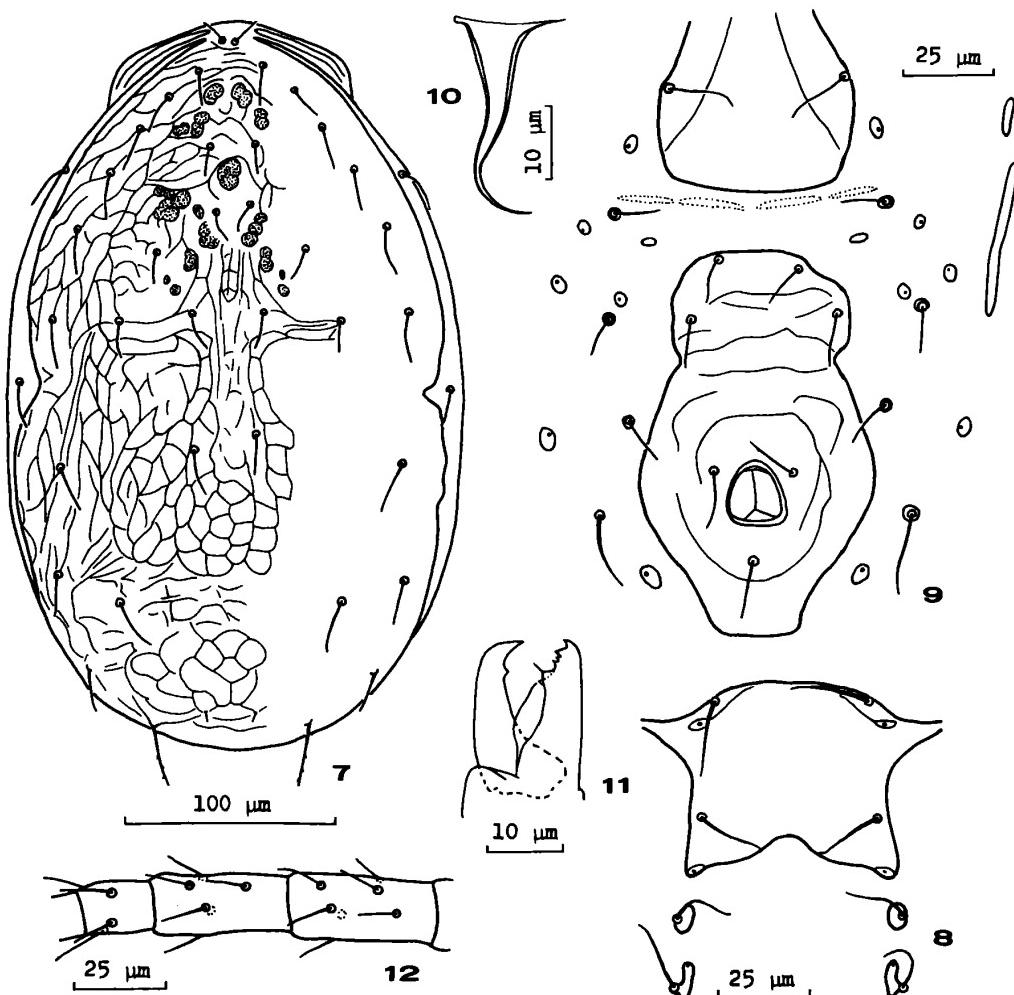
Paraseiulus soleiger: Muma, 1961 [11], p. 300; Karg, 1971 [12], p. 216, figs. 233a, 234a, 235a.

Typhlodromus (Paraseiulus) soleiger: van der Merwe, 1968 [13], p. 60.

Paraseiulus (Paraseiulus) soleiger: Wainstein, 1976 [14], p. 698.

Female Body heavily sclerotized. Dorsal shield reticulate, without solenostomes. Setae on dorsal shield: L_{10} the largest, barbed; M_3 and L_8 slightly barbed or smooth; the remaining setae smooth, L_8 more or less shorter than distance between bases of L_8 and M_3 . Setae S_1 and S_2 on interscutal membrane. Paritreme not extending

beyond seta D_1 ; posterior extension of peritrematal shield without transverse suture. Sternal shield with posterior margin concave, with two pairs of setae; third pair of sternal setae on platelets; metasternal platelets slender, sometimes absent. Ventrianal shield slender, slightly wider than genital shield, with lateral margins constricted to form a waist, widest at level of anus; two pairs of preanal setae anterior to the waist; no solenostomes. Two pairs of slender metapodal platelets, the posterior pair very long. Spermatheca as figured. Fixed digit of chelicera with two or three subapical, contiguous teeth and one middle tooth; the movable digit with one tooth. Chaetotaxic formula: genu II, 2–2/1, 2/0–1; genu III, 1–2/1, 2/0–1. Leg IV without macrosetae. Measurements in μm : length of idiosoma 320,



FIGS. 7–12. *Typhlodromus (Paraseiulus) soleiger* (Ribaga) (♀). 7: Dorsum of idiosoma. 8: Sternal shield. 9: Posterior ventral surface. 10: Spermatheca. 11: Chelicera. 12: Basitarsus, tibia and genu of leg IV.

width of idiosoma 190; length of setae (n=10): L₁ 18.0±0.4, L₂ 17.4±0.4, L₃ 19.3±0.4, L₄ 20.7±0.5, L₅ 22.6±0.4, L₆ 22.9±0.5, L₇ 23.4±0.4, L₈ 21.4±0.3, L₉ 20.5±0.4, L₁₀ 26.5±0.6, M₁ 13.8±0.3, M₂ 16.1±0.3, M₃ 24.3±0.5, D₁ 13.3±0.2, D₂ 13.3±0.3, D₃ 13.2±0.3, D₄ 16.2±0.1, D₅ 19.5±0.4, D₆ 6.3±0.2, S₁ 20.3±0.6, S₂ 17.3±0.3, VL₁ 20.7±0.4.

Male Not available in the present study.

Specimens examined Eight ♀♀, Hokkaido University campus, Sapporo, Hokkaido, 30-V-1982 (T. Gotoh), on *Betula platyphylla* Sukatchev var. *japonica* (Miq.) Hara; 7 ♀♀, 9-IX-1983 (T. Gotoh & S. Ehara), other data the same as for the above.

Remarks *Typhlodromus soleiger* is recorded from Japan for the first time. Previously this species was known from Europe, England, U. S. S. R., Canada, the United States, and China.

Amblyseius (Amblyseius) koyamanus

Ehara et Yokogawa
(Figs. 13 and 14)

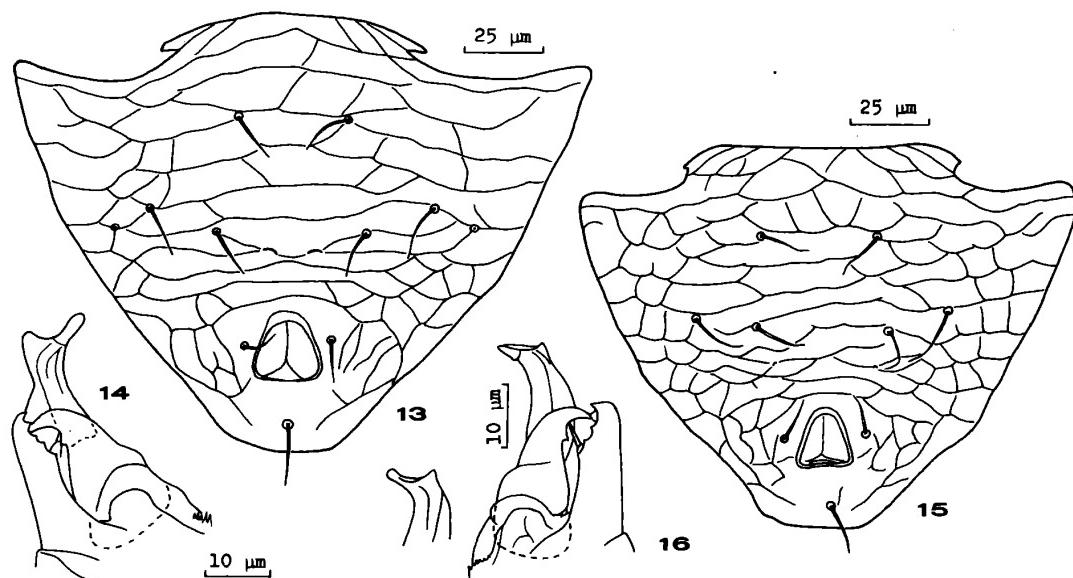
Amblyseius (Amblyseius) koyamanus Ehara and Yokogawa, 1977 [15], p. 50, figs. 1-8.

Male Setae S₁ and S₂ on dorsal shield.

Peritreme not extending to seta D₁. Ventrianal shield not fused with peritrematal shield, with three pairs of preanal setae; a pair of distinct, crescentic solenostomes between and slightly posteriad from posterior pair of preanals. Chelicera with four teeth on fixed digit, one on movable digit; spermatodactyl as figured. Measurements in μm : length of idiosoma 300, width of idiosoma 200; length of setae (n=10): L₁ 17.5±0.5, L₂ 16.2±0.3, L₃ 16.2±0.3, L₄ 19.0±0.3, L₅ 15.4±0.2, L₆ 18.4±0.4, L₇ 18.8±0.4, L₈ 17.4±0.3, L₉ 35.9±0.7, M₁ 12.6±0.2, M₂ 25.2±0.7, D₁ 14.6±0.4, D₂ 12.2±0.3, D₃ 12.0±0.2, D₄ 13.1±0.3, D₅ 15.6±0.3, D₆ 10.3±0.2, S₁ 16.6±0.4, S₂ 15.9±0.3, VL₁ 22.1±0.4, macroseta on basitarsus IV 35.4±0.5.

Specimens examined Four ♂♂, Tottori Sand Dune, Tottori Pref., Honshu, 9-IX-1979 (M. Hirota), on *Ischaemum antephoroides* (Steud.) Miq.; 5♀♀ & 3♂♂, 21-VII-1981 (S. Ehara), 6♀♀ & 3♂♂, 1-IX-1981 (S. E.), 2♀♀ & 1♂, 26-VII-1983 (S. E.), other data the same as for the above; 1♂, 25-IX-1979 (M. H.), on *Pinus thunbergii* Parlat, locality the same as for the above.

Additional materials: many ♀♀ & ♂♂, Tottori Sand Dune, IX-X-1979 (M. H.), on *Ischaemum antephoroides* (Steud.) Miq., *Digitaria adscendens* (H. B. K.) Henr., *Eragrostis curvula*



FIGS. 13 and 14. *Amblyseius (Amblyseius) koyamanus* Ehara et Yokogawa (♂). 13: Ventrianal shield. 14: Chelicera.

FIGS. 15 and 16. *Amblyseius (Amblyseius) hirotae* n. sp. (♂). 15: Ventrianal shield. 16: Chelicera.

(Schrad.) Nees, *Pinus thunbergii* Parlat., *Linaria japonica* Miq., *Vitex rotundifolia* Linn., and *Artemisia capillaris* Thunb.; many 우우 & 손손, Okayama City, Honshu, 14~17-X-1983 (Y. Okada), on *Echinochloa crus-galli* (Linn.) Beauv. var. *crus-galli*, *Miscanthus sinensis* Anderss., *Eragrostis multicaulis* Steud., *Digitaria adscendens* (H. B. K.) Henr., and *Aridropogon virginicus* Linn.

Remarks *Amblyseius koyamanus* was described originally based on females taken from graminaceous plants at Koyama, Tottori City.

The male of this species is described and figured for the first time.

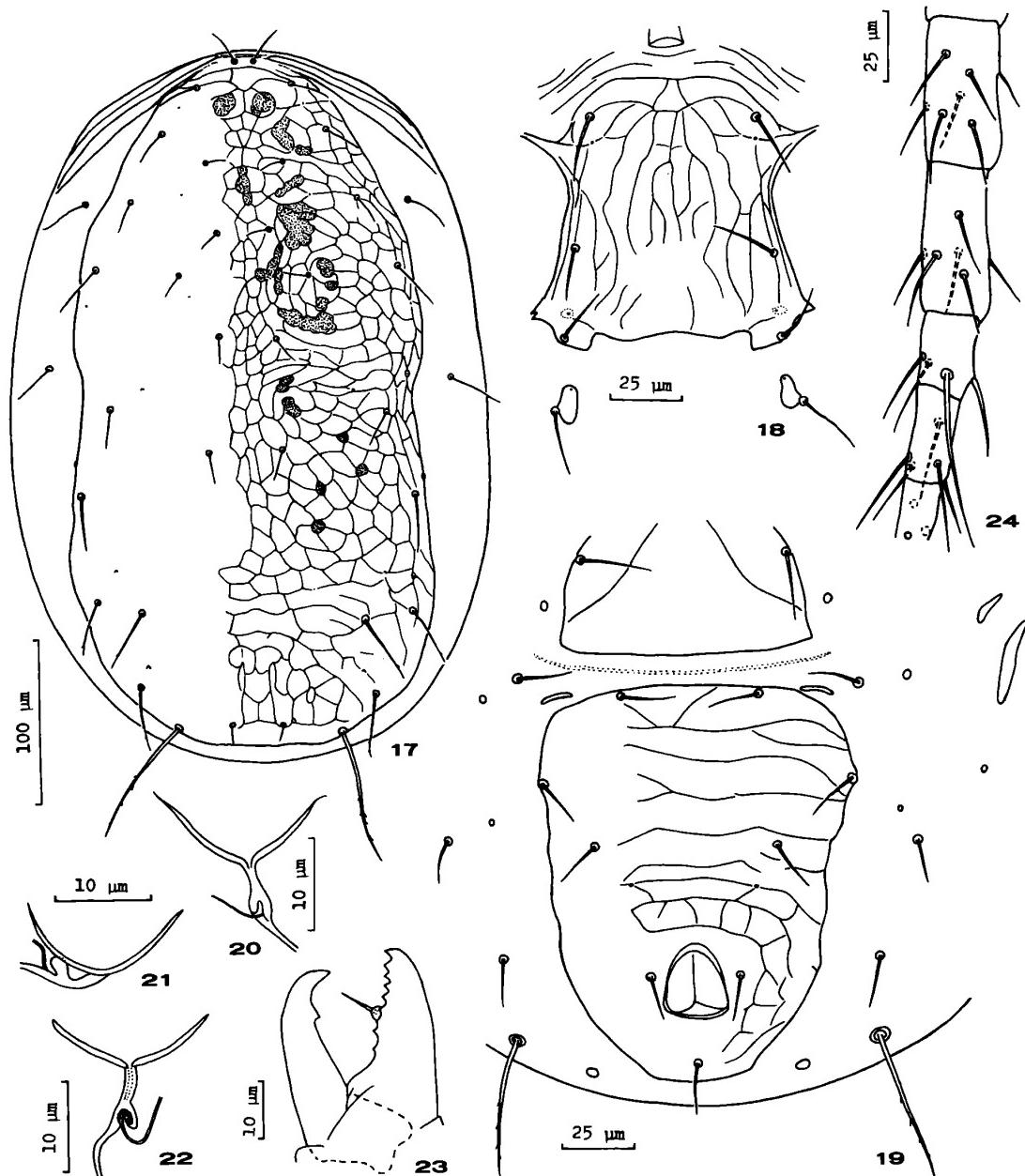
Amblyseius (Amblyseius) hirotae n. sp.

(Japanese name: Nise-koyama-kaburidani)
(Figs. 15-24)

Amblyseius (Amblyseius) sp.: Ehara et al., 1980 [16], p. 67, figs. 3-6.

Amblyseius sp.: Ehara, 1983 [17], p. 64.

Female Dorsal shield reticulate, with seven



Figs. 17-24. *Amblyseius (Amblyseius) hirotae* n. sp. (♀). 17: Dorsum of idiosoma. 18: Sternal shield. 19: Posterior ventral surface. 20-22: Spermatheca. 23: Chelicera. 24: Genu, tibia and basitarsus of leg IV.

pairs of solenostomes. Setae on dorsal shield: L₉ barbed, much larger than the others; M₂ barbed, longer than distance between its base and that of L₇; L₇ and L₈ barbed; the remaining setae smooth. Setae S₁ and S₂ on interscutal membrane. Peritreme not extending to seta D₁; posterior extension of peritrematal shield slender, without transverse suture. Sternal shield with three pairs of setae; metasternal platelets longer than wide. Ventrianal shield longer than wide, wider than genital shield, with lateral margins slightly concave or nearly straight, with three pairs of preanal setae; a pair of minute solenostomes behind and slightly mediad to posterior pair of preanals. Seta VL₁ barbed. Two pairs of slender metapodal platelets. Spermatheca with cervix semicircular. Fixed digit of chelicera with seven or eight teeth; the movable digit with one tooth. Chaetotaxic formula: genu II, 2-2/0, 2/0-1; genu III, 1-2/1, 2/0-1. Leg IV with one macroseta on basitarsus. Measurements in μm : length of idiosoma 400, width of idiosoma 250; length of setae (n=10): L₁ 27.3±0.5, L₂ 19.8±0.3, L₃ 18.3±0.3, L₄ 30.2±0.4, L₅ 20.8±0.3, L₆ 29.7±0.4, L₇ 31.4±0.4, L₈ 33.8±0.5, L₉ 74.0±0.9, M₁ 13.5±0.2, M₂ 34.8±0.4, D₁ 21.8±0.2, D₂ 13.2±0.2, D₃ 13.1±0.1, D₄ 15.9±0.1, D₅ 18.7±0.4, D₆ 12.0±0.2, S₁ 28.2±0.4, S₂ 26.3±0.4, VL₁ 48.6±0.8, macroseta on basitarsus IV 61.0±0.5.

Male Setae S₁ and S₂ on dorsal shield. Peritreme not extending to seta D₁. Ventrianal shield not fused with peritrematal shield, with three pairs of preanal setae; a pair of minute solenostomes behind and slightly mediad of posterior pair of preanals. Fixed digit of chelicera with four teeth; movable digit unidentate; spermatodactyl as figured. Measurements in μm : length of idiosoma 300, width of idiosoma 200; length of setae (n=8): L₁ 25.5±0.6, L₂ 18.1±0.4, L₃ 17.4±0.3, L₄ 27.2±0.4, L₅ 19.7±0.4, L₆ 27.1±0.5, L₇ 30.8±0.7, L₈ 33.4±1.0, L₉ 62.8±1.2, M₁ 13.1±0.3, M₂ 40.4±0.5, D₁ 20.1±0.3, D₂ 12.3±0.2, D₃ 12.6±0.3, D₄ 15.0±0.7, D₅ 18.3±0.3, D₆ 10.2±0.5, S₁ 25.5±0.4, S₂ 22.8±0.5, VL₁ 41.2±1.0, macroseta on basitarsus IV 57.8±0.4.

Type-series Holotype: ♀, Tottori Sand Dune, Tottori Pref., Honshu, 26-VII-1983 (S. Ehara), on *Ischaemum antephoroides* (Steud.) Miq.

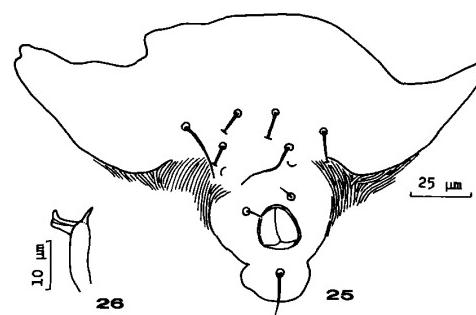
Paratypes: 8♀♀ & 2♂♂, data the same as for holotype; 5♀♀ & 1♂, 1-IX-1981 (S. E.), 3♀♀ & 1♂, 23-X-1979 (M. Hirota), other data the same as for holotype; 3♀♀ & 1♂, 23-X-1979 (M. H.), on *Digitaria ascendens* (H. B. K.) Henr., 3♀♀, 25-IX-1979 (M. H.), 2♀♀, 1-XI-1979 (M. H.), on *Eragrostis curvula* (Schrad.) Nees, locality the same as for holotype.

Remarks *Amblyseius hirotae* n. sp. differs from the very closely related *A. bicaudus* Wainstein, 1962 [18], in that the cervix of the spermatheca is semicircular, whereas in the latter it is nearly U-shaped [19, 20].

Amblyseius (Indoseiulus) liturivorus Ehara (Figs. 25 and 26)

Amblyseius (Indoseiulus) liturivorus Ehara, 1982 [5], p. 43, figs. 10-18.

Male Setae S₁ and S₂ on dorsal shield. Peritreme not extending to level of seta L₂. Ventrianal shield not fused with peritrematal shield, indented laterad of distinct solenostomes; three pairs of preanal setae; paranals flanking anterior end of anus. Spermatodactyl as figured. Measurements in μm : length of idiosoma 310, width of idiosoma 240, length of dorsal shield 303, width of dorsal shield 208; length of setae (n=2): D₁ 30.3, L₄ 25.7, L₉ 40.0, M₂ 22.7, VL₁ 24.3, macrosetae on leg IV: genu 38.6, tibia 40.0, basitarsus 45.8.



Figs. 25 and 26. *Amblyseius (Indoseiulus) liturivorus* Ehara (♂). 25: Ventrianal shield. 26: Spermatodactyl.

Specimens examined Two ♀♀ & 1♂, Taishi, Osaka Pref., Honshu, 30-IX-1982 (K. Inoue), on grape (in vinyl house).

Remarks *Amblyseius liturivorus* was known

only from females found on soy bean in a greenhouse of Wakayama Prefecture, Honshu. The male is described and figured for the first time. The single male specimen studied here is not in good condition.

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